

CLAIMS

1. Electrical machine forming an actuator or generator comprising an active part with one or several phases designed to be connected to an electrical source or load, and a passive part, these two parts being free  
5 to move with respect to each other, the active part including a global solenoid winding (110, 210, 310) for each phase and comprising a stack of ferromagnetic or non-magnetic parts (400) and magnetized parts (500) inside this or these windings, the magnetized parts  
10 having magnetization directions parallel to the relative displacement direction and successive magnetization directions opposite to each other, the ferromagnetic or non-magnetic parts of this stack being provided with passages each carrying at least one element (600) free to  
15 slide with respect to the active part, this or these sliding elements forming the passive part, each sliding element including a succession of alternately magnetic portions (620) and non-magnetic portions (630) arranged to be facing the different magnetized or non-magnetized parts of the stack one after the other, such that an  
20 alternating magnetic flux is generated in the winding in each phase, characterized in that the passages formed in the ferromagnetic or non-magnetic parts of the stack form orifices for which the internal section surrounds a  
25 sliding element each time, and in that the sliding elements (600) are rods each of which has an external periphery complementary to the internal section of the orifices through which they pass, such that each rod (600) interacts magnetically with the ferromagnetic or

non-magnetic part (500) through which its external periphery passes.

2. Machine according to claim 1, characterized in that the orifices have a circular cross-section and each 5 rod (600) is in the form of a rotating cylinder.

3. Machine according to claim 2, characterized in that each of the rods comprises at least a longitudinal groove.

4. Machine according to any one of the previous 10 claims, characterized in that the number of phases is equal to  $q$  and each phase is offset from the mobile part in the displacement direction by a distance such that each of their magnetic fluxes is offset by a number equal to  $N\pi/q$ , where  $N$  is an integer.

15 5. Machine according to any one of the previous claims, characterized in that each magnet (500) is formed by a ring surrounding a corresponding rod (600).

20 6. Machine according to any one of claims 1 to 4, characterized in that each magnet is formed by a magnetized plate (500) perpendicular to the displacement, provided with a series of orifices, a corresponding rod (600) passing through each orifice.

25 7. Machine according to any one of the previous claims, characterized in that each rod is formed of a central non-magnetic core and a series of alternately magnetic and non-magnetic rings (620, 630).

30 8. Machine according to any one of the previous claims, characterized in that it comprises one or several annular and possibly slit positioning sensors (800), comprising one or several windings, the sensors being fixed to the active part and one or several rods (600) of the passive part passing through them.

9. Machine according to any one of the previous claims, characterized in that each of the positioning sensors (800) is located around a rod and offset in the direction of displacement of the active and passive parts 5 with respect to each other.

10. Machine according to any one of the previous claims, characterized in that it comprises at least one device (710, 720) for collection of forces applied by at least one rod (600), this rod (600) and this device 10 cooperating by applying a single-directional contact along the tension direction of the rod, such that the force collection device does not create any compression reaction on the rod.

11. Machine according to claim 10, characterized in 15 that there is a clearance under the contact between the rod (600) and the force collection device (710, 720).

12. Machine according to claim 10 or claim 11, characterized in that the force collection device (710, 720) is a transverse plate fixed to a main spindle of the 20 machine (700), and in that each rod (600) passes through this plate (710, 720) and is provided with a bearing head (640, 650) in contact with this plate (710, 720).

13. Machine according to any one of the previous claims, characterized in that the rod(s) (600) has (have) 25 a cross-section, the circumference of which forms a smooth line with no abrupt change of direction.